QUARTERLY PROGRESS REPORT

Report Title: Field Demonstration of a Membrane Process to Separate Nitrogen from Natural Gas: Twenty-Second Quarterly Progress Report (First Quarter 2007).

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Disclaimer

Abstract

The original proposal described the construction and operation of a 1 MMscfd treatment system to be operated at a Butcher Energy gas field in Ohio. The gas produced at this field contained 17% nitrogen. During pre-commissioning of the project, a series of well tests showed that the amount of gas in the field was significantly smaller than expected and that the nitrogen content of the wells was very high (25 to 30%). After evaluating the revised cost of the project, Butcher Energy decided that the plant would not be economical and withdrew from the project.

Since that time, Membrane Technology and Research, Inc. (MTR) has signed a marketing and sales partnership with ABB Lummus Global, a large multinational corporation. MTR is working with the company's Randall Gas Technology group, a supplier of equipment and processing technology to the natural gas industry. Randall's engineering group found a new site for the project at a North Texas Exploration (NTE) gas processing plant, which met with limited success. MTR then located an alternative testing opportunity and signed a contract with Towne Exploration in the third quarter of 2006, for a demonstration plant in Rio Vista, CA, to be run through May 2007. The demonstration for Towne has already resulted in the sale of two commercial skids to the company; the units will be delivered in mid-2007. Total sales of nitrogen/natural gas membrane separation units from the partnership with ABB are now approaching $4.0 million.

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Introduction

The U.S. natural gas pipeline specification for inert gases is less than 4%. On this basis, about 17% of known U.S. reserves of gas are sub-quality due to high nitrogen content. Some of this gas can be brought to pipeline specifications by dilution with low-nitrogen-content gas; some is treated by cryogenic condensation and fractionation. Nonetheless, about 1.0 trillion scf of known reserves are currently shut in.

This project covers the first demonstration of a new membrane technology to treat this otherwise unusable gas. The objective of this project is to develop a membrane separation process to separate nitrogen from high-nitrogen-content natural gas. To demonstrate the process, a proof-of-concept plant was built for a North Texas Exploration (NTE) gas field in Texas. A short test of the unit was of limited success due to a smaller-than-anticipated feed stream at the test site. MTR then located an alternative testing opportunity and signed a contract with Towne Exploration for a demonstration of the unit at Rio Vista, CA, from September 2006 to May 2007.

Experimental Update, Results and Discussion

During this quarter, Towne operated the Rio Vista demonstration unit continuously to treat a feed gas containing 16 mol% nitrogen. The feed gas has a Btu/scf value of only 900 Btu/scf; Towne is currently upgrading it to about 975 Btu/scf, and delivering it to Pacific Gas & Electric (PG&E). The unit has been online in a virtually continuous mode for the past 6-7 months.

The first of Towne's two identical commercial skid units will be delivered in May-June 2007, with the second scheduled for July 2007.

Commercialization Update

MTR and ABB have now sold a total of eight commercial nitrogen/natural gas membrane separation units related to the technology developed during this project. Commercial sales of natural gas/ nitrogen membrane separation units related to this project technology now total $4.0 million.

Currently, there are several potential orders under review by customers, and inquiry activity continues at a high level.

Conclusions

MTR has successfully tested the nitrogen/natural gas separation process in a commercial unit and demonstrated its performance at one wellhead site in Kentucky. The successful demonstration resulted in the sales of several additional commercial units. All installed commercial units are operating at or better than guarantee conditions and our clients have given us several good references for further development of this business. Total commercial sales of $4.0 million have been made for the product line developed from this project. Further sales are expected in 2007.

References

None cited.